

PATENT

Atty Docket No.: 200310065-1
App Ser. No.: 10/657,527

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the claim amendments and following remarks. By virtue of the amendments above, claim 11 has been amended. Accordingly, claims 1-13 are currently pending in the present application, of which, claims 1, 7, and 11 are independent.

No new matter has been introduced by way of the claim amendment; entry thereof is therefore respectfully requested.

Claims 1-13 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Raskar (U.S. Patent No. 6,520,647) in view of Iwai et al. (U.S. Patent No. 6,816,187). The above rejections are respectfully traversed for at least the reasons set forth below.

Drawings

The indication that the drawings submitted on December 22, 2003 and October 27, 2004 have been accepted is noted with appreciation.

Specification

The Official Action has objected to the disclosure as alleging containing informalities. More particularly, the Official Action asserts that the recitations of the attorney docket numbers on page 16 should be replaced with its corresponding application serial numbers. The Specification has been amended to replace the attorney docket numbers with their corresponding application serial numbers on page 16. Accordingly, the Examiner is respectfully requested to withdraw the objection to the disclosure.

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Claim Objection

Claim 11 has been objected to for allegedly having an informality. Specifically, claim 11 was objected to because the word "system" in line 4 of the claim should be "apparatus". Claim 11 has been amended to correct this informality and the Examiner is therefore respectfully requested to withdraw the objection of claim 11.

Claim Rejection Under 35 U.S.C. §103

The test for determining if a claim is rendered obvious by one or more references for purposes of a rejection under 35 U.S.C. § 103 is set forth in MPEP § 706.02(j):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Therefore, if the above-identified criteria are not met, then the cited reference(s) fails to render obvious the claimed invention and, thus, the claimed invention is distinguishable over the cited reference(s).

Claims 1-13 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Raskar in view of Iwai et al. This rejection is respectfully traversed because Raskar and Iwai et al., considered singly or in combination, fail to teach or suggest the claimed invention as set forth in claims 1, 7, 11, and their depending claims.

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App Scr. No.: 10/657,527**Claims 1-6**

Claim 1 discloses a method for correcting non-uniformity in luminance of an image generated by a projector and displayed obliquely on a screen. The projector has a plurality of pixels for use in generating images and each projector pixel subtends to a corresponding projected area on the screen. The projector pixel that subtends to the largest projected area on the screen is identified with a camera and a ratio between the projected area of each pixel and the largest projected area is determined. This ratio is organized into an attenuation array that is then used to modify the luminance information of an input image to drive the projector. As a result of the modification, the image displayed on the screen is uniformly luminescent.

The Official Action alleges that Raskar discloses all of the elements of claim 1 except for the modification of luminance information. For instance, the Official Action alleges that Raskar discloses that a projector pixel that subtends to the largest projected area on the screen is identified, but does not accurately identify where in the Raskar document such a disclosure is made. Instead, the Official Action merely asserts that Raskar comprises "means (also see 203) for identifying the projector pixel that subtends to the largest projected area on the screen". In addition, the Official Action states that column 3, lines 17-21 somehow discloses that "each projector pixel subtends to a corresponding projected area on the screen".

There appears to be no disclosure in Raskar that the camera 203 is for identifying the projector pixel that subtends to the largest projected area on the screen. In addition, the passage in column 3, lines 17-21 pertains to deriving an azimuth angle from a single planar projective transformation between pixel locations in the projected image and corresponding pixel locations in an input image and not to identification of the projector pixel that subtends

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to the largest projected area on the screen. It is therefore, respectfully submitted that the Official Action has failed to establish that Raskar discloses that a projector pixel that subtends to the largest projected area on the screen is identified.

It is also respectfully submitted that a citation to a particular section in Raskar is missing in the Official Action because Raskar does not disclose at least this feature. In addition, therefore, Raskar cannot disclose that a ratio is determined between the projected area of each pixel and the largest projected area. Moreover, because Raskar does not disclose that a ratio between the projected area of each pixel and the largest projected area is determined, Raskar cannot disclose that such a ratio is organized into an attenuation array for each pixel.

Regardless of this fact, the Official Action asserts that the disclosure contained in Figure 4, column 3, lines 17-40, and column 3, line 55 to column 4, line 37, of Raskar somehow discloses that the above-identified ratio is determined and that the ratio is organized into an attenuation array. Column 3, lines 17-40 describes what is shown in Figure 4. In addition, this passage discusses a process in which an image is warped so that the image fits within a predetermined quadrilateral 104. The passage contained in column 3, line 55 to column 4, line 37 discloses part of a process for rendering given three angles using 3D graphics. As may clearly be seen, none of these cited passages in Raskar discloses that a ratio between the projected area of each pixel and the largest projected area is determined. In addition, none of these cited passages discloses that a ratio determined for each pixel is organized into an attenuation array.

Clearly, therefore, Raskar fails to disclose features claimed in claim 1 in addition to the luminance modification.

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The Official Action relies upon the disclosure contained in Iwai et al. in an effort to make up for some of the deficiencies in Raskar. More particularly, the Official Action asserts that Iwai et al. discloses modification of luminance information. In addition, the Official Action asserts that the proposed modification would have been obvious "to minimize a luminance error between corresponding pixels of the projector, camera, and screen."

Initially, it is respectfully submitted that Iwai et al. pertains to a camera calibration apparatus (Abstract) and is therefore not intended for modifying luminance of an image generated by a projector. In this regard, and as described in Iwai et al., "[t]he present invention relates to a camera calibration method and apparatus for calculating a parameter representative of a characteristic of a camera, and more particularly to a camera calibration method and apparatus for calculating a parameter of a camera which is of a type for picking up an image of a subject to output electronic image data." Column 1, lines 9-14.

For at least this reason, Iwai et al. does not disclose that the projector pixel that subtends to the largest projected area on the screen is identified with a camera. In addition, therefore, Iwai et al. does not disclose that a ratio between the projected area of each pixel and the largest projected area is determined. Iwai et al. further does not disclose that the ratio determined for each pixel is organized into attenuation array. Iwai et al. moreover fails to disclose that luminance information of an input image received by the projector is modified by the ratios of the attenuation array.

Therefore, even if one of ordinary skill in the art were somehow motivated to modify the disclosure contained in Raskar with the disclosure contained in Iwai et al., the proposed modification would still fail to yield the present invention as set forth in claim 1. As such, the Official Action has failed to prove a *prima facie* case of obviousness with respect to claim

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1 of the present invention. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claim 1 and to allow this claim. Claims 2-6 depend from allowable claim 1 and are also allowable over Raskar in view of Iwai et al. at least by virtue of their dependencies.

Claims 7-13

Claim 7 pertains to a system for correcting luminance of an image displayed with an oblique shape on a screen having a surface. The system includes a projector having a non-perpendicular optical axis relative to the surface of the screen. The system also includes a camera having a substantially perpendicular optical axis relative to the surface of the screen and a luminance correction engine for receiving the captured image from the camera and sending an attenuation array to the projector. The projector receives the attenuation array and modifies the luminance of the image.

Claim 11 pertains to an apparatus for correcting non-uniformity in luminance of an image generated by a projector and displayed obliquely on a screen having a surface. The projector has a plurality of pixels for use in generating images and each projector pixel subtends to a corresponding projected area on the screen. The apparatus includes means for capturing the image, means for calculating an attenuation array based upon the captured image, means for modifying luminance information of an input image received by the projector by the attenuation array, and means for driving the projector with the modified luminance information such that the image produced on the screen is uniform in luminance.

The Official Action asserts that Raskar discloses all of the features of claims 7 and 11, except for the step of "modifying 'luminance' information to drive the projector/ a

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‘luminance’ correction engine/ means for modifying luminance information of an input image.” Although Raskar clearly fails to disclose these features of claims 7 and 11, Raskar fails to disclose other features claimed in claims 7 and 11. For instance, with respect to claim 7, Raskar shows in Figure 2 that the optical axis of the projector 200 is the same as the optical axis of the camera 203. As such, Raskar fails to disclose that the projector 200 has a non-perpendicular optical axis relative to the surface of the screen while the camera has a substantially perpendicular optical axis relative to the surface of the screen, as recited in claim 7 of the present invention.

The Official Action relies upon the disclosure contained in Iwai et al. in an attempt to make up for the deficiencies in Raskar. More particularly, the Official Action alleges that Iwai et al. discloses a “luminance correction engine”. In this regard, the Official Action does not assert that Iwai et al. can be used to modify the disclosure of Raskar to somehow cause the optical axes of the projector 200 and the camera 203 to differ from each other. In fact, such a modification of Raskar would clearly destroy the intended purpose of Raskar as the camera 203 would then have to be removed from the projector 200 housing. In addition, such a proposed modification may render the tilt sensors 201 and 202 useless.

The proposed modification of Raskar with the disclosure contained in Iwai et al. would fail to disclose the present invention as set forth in claims 7 and 11 for additional reasons. For instance, the “luminance engine” (arithmetic processing section 11), as referred to in the Official Action is actually quite different from the luminance correction engine claimed in claim 7 and the means for modifying luminance information claimed in claim 11.

As discussed hereinabove, Iwai et al. pertains to an apparatus and method for calibrating a camera. In this regard, Iwai et al. discloses a light projector 22 for projecting a

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base image on a screen that the camera calibration system 10 images and analyzes. The light projector 22 is used to display a pattern having a predefined geometrical configuration (column 4, lines 59-65), "which eliminates the need for the formation of a pattern on a screen by printing" (column 11, lines 31-32). The imaged pattern is processed to correct luminance in the image processed by the arithmetic processing section 11 (column 15, lines 22-55). In addition, Iwai et al. does not appear to disclose that the light projector 22 does not modify the luminance of the image displayed on the screen. In fact, it appears that modification of the displayed image luminance would make it more difficult or impossible for the arithmetic processing section 11 to actually perform the luminance correction processing described above.

As such, there appears to be no reason in Iwai et al. to send an attenuation array to the light projector 22, where the light projector 22 receives the attenuation array and modifies the luminance of the image. In fact, Iwai et al. does not appear to even disclose that a luminance correction engine is capable of organizing or sending an attenuation array to the light projector 22. In this regard, for instance, Iwai et al. fails to disclose that the camera calibration system 10 includes means for driving the projector with a modified luminance information such that the image produced on the screen is uniform in luminance as claimed in claim 11.

For at least these reasons, the proposed combination of Raskar and Iwai et al. would still fail to disclose the claimed invention as set forth in claims 7 and 11. The Official Action has therefore failed to prove that a *prima facie* case of obviousness exists under 35 U.S.C. § 103 based upon these documents. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 7 and 11 and to allow these claims. Claims 8-10 depend

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from allowable claim 7 and claims 12 and 13 depend from allowable claim 11, and are also allowable over Raskar in view of Iwai et al. at least by virtue of their dependencies.

Conclusion

In light of the foregoing, withdrawal of the rejections of record and allowance of this application are earnestly solicited.

Should the Examiner believe that a telephone conference with the undersigned would assist in resolving any issues pertaining to the allowability of the above-identified application, please contact the undersigned at the telephone number listed below. Please grant any required extensions of time and charge any fees due in connection with this request to deposit account no. 08-2025.

Respectfully submitted,

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By



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